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# Analysis of Junior High School Students' Critical Thinking Skill Profile on Ecosystem Topic

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**Abstract**

This study aims to describe junior high school students' critical thinking skills in the context of the ecosystem topic and examine the relationship between the use of website-based learning media and students' critical thinking skills. Data were collected using critical thinking skills tests and questionnaires assessing students' responses to website-based learning. Both qualitative and quantitative data analysis techniques were employed. The results revealed that students demonstrated the lowest performance on the basic support indicator, with a score of 27%. The questionnaire results indicated that 46% of students agreed and 29% strongly agreed that website-based learning could enhance their learning motivation and contribute to the development of their critical thinking skills. These findings suggest that students' critical thinking skills remain relatively low and require further improvement. One potential approach is to integrate problem-based learning with website-based learning media to create a more engaging learning environment, facilitate students' understanding of ecosystem concepts, and support the development of their critical thinking skills.

## INTRODUCTION

The 21st century has ushered in a new era characterized by rapid development and advancements in various fields, including technology, information, and societal transformation. The rapid growth of information technology presents challenges for individuals and affects various aspects of daily life, including education (Pahrijal et al., 2023). Education requires particular attention because it plays a crucial role in developing human resources capable of remaining competitive in an increasingly dynamic world (Lian & Amiruddin, 2021). These conditions require individuals to develop a range of essential competencies that extend beyond conventional academic knowledge and encompass practical skills necessary to navigate contemporary challenges.

Education and skills development in the 21st century emphasize the importance of four core competencies, commonly referred to as the 4Cs: critical thinking and problem-solving, creativity, communication, and collaboration (Priyono & Sinurat, 2020). These competencies are intended to prepare individuals to address the challenges and opportunities arising from rapid global changes. In line with this perspective, Qomariah and Supardi (2021) stated that one of the educational goals in Indonesia is to develop students' critical thinking skills. Critical thinking involves deliberate, evidence-based reasoning that promotes consistency between

thought and action (Ennis, 2011). These skills enable individuals to make informed decisions, formulate logical and well-supported arguments, and draw accurate conclusions based on available information (Purwanto et al., 2022).

Critical thinking skills are also essential for achieving successful learning outcomes, particularly in science education. Science learning requires students to develop critical thinking skills to draw appropriate conclusions through the analysis and evaluation of information when solving problems. This is because science education involves logical reasoning processes, including investigating phenomena, integrating existing knowledge with new evidence, and formulating evidence-based conclusions.

The results of the Programme for International Student Assessment (PISA) 2022 indicated that Indonesia's ranking improved by five positions compared with the previous assessment. However, its science performance score declined by 12 points, representing a relatively small decrease compared with those observed in several other countries. These findings suggest persistent challenges in Indonesian students' scientific literacy, which may be associated with difficulties in applying higher-order thinking skills. Students may demonstrate stronger performance on tasks requiring the recall of information while experiencing difficulties with higher-order cognitive tasks at levels C4–C6 of the revised Bloom's taxonomy, namely analyzing, evaluating, and creating (OECD, 2023). Furthermore, students continue to experience difficulties analyzing and solving complex problems that require critical thinking skills.

Assessing students' critical thinking skills requires appropriate measurement instruments, including tests designed to evaluate specific dimensions of critical thinking. Such tests generally incorporate several indicators representing essential critical thinking competencies. According to Ennis (2011), these indicators comprise five dimensions: (1) elementary clarification, (2) basic support, (3) inference, (4) advanced clarification, and (5) strategies and tactics. Improving Indonesian students' critical thinking skills is essential to equip them with the competencies needed to address various challenges and solve problems encountered in everyday life (Ariadila et al., 2023). Previous studies have examined students' critical thinking skills in science topics, including the classification of living organisms (Prihatiningsih et al., 2016) and physics (Romadona & Adila, 2020), reporting relatively low levels of critical thinking performance. These findings highlight the need for further investigations across different science topics, particularly ecosystems, to obtain a more comprehensive understanding of students' critical thinking skills.

Assessing critical thinking skills through approaches aligned with contemporary technological advancements is increasingly important, given the rapid development of science and technology. Teachers can integrate digital technologies into instructional practices to support teaching, learning, and assessment processes. One potential approach involves the use of website-based learning media to facilitate learning activities and assess students' critical thinking skills. Websites can present engaging instructional materials through combinations of images, videos, audio, and visually appealing text to stimulate students' interest in learning (Mashudi et al., 2023). Website-based platforms also enable the delivery of various forms of educational content, including text, images, videos, and audio, which students can access online using digital devices such as laptops, desktop computers, smartphones, and tablets (Yanto et al., 2023). Website-based learning media are expected to increase students' interest in learning,

deepen their understanding of instructional materials, and potentially support the development of critical thinking skills. This expectation is supported by research conducted by Karyati (2023), which reported that 95.5% of students provided positive questionnaire responses regarding the contribution of educational websites to their learning motivation, while 100% of the participating teachers indicated that website-based learning could enhance students' motivation. Therefore, this study aims to describe the profile of junior high school students' critical thinking skills in the context of the ecosystem topic through the use of website-based learning media. The findings are expected to provide empirical evidence that educators can use to design more effective digital learning interventions and serve as a foundation for future research integrating problem-based learning with website-based instructional media.

## METHOD

This study employed a quantitative research method with a descriptive approach to assess students' critical thinking skills and their perceptions of website-based learning. The study was conducted at SMP YPM 4 Bohar Taman, Sidoarjo, during the 2025/2026 academic year. The research population comprised seventh-grade students, with a sample of 165 students from classes VII B, VII C, VII D, VII E, and VII F. Random sampling was employed to select the research participants (Arieska & Herdiani, 2018). Data were collected through a critical thinking skills test and a student response questionnaire regarding website-based learning.

The research instruments consisted of a critical thinking skills test and a student response questionnaire. The critical thinking skills test comprised 10 multiple-choice questions covering the ecosystem topic, which students completed individually. Each correct answer was awarded 10 points, while incorrect answers received 0 points, resulting in a maximum possible score of 100. The test items were developed based on the critical thinking indicators proposed by Ennis (2011), as presented in Table 1.

**Table 1.** Indicators of Critical Thinking Skills

| Critical Thinking Skills Indicator | Question Item Number |
|---|---|
| Elementary clarification | 1, 2 |
| Basic support | 3, 4 |
| Inference | 5, 6 |
| Advance clarification | 7, 8 |
| Strategic and tactics | 9, 10 |

Before being administered to the research participants, the critical thinking skills test was assessed for validity and reliability using a pilot sample of 25 students. Item validity was examined using Pearson's product-moment correlation in SPSS at a significance level of 0.05 (N = 25). All test items demonstrated calculated correlation coefficients (r-values) exceeding the critical value (r-table), indicating that the items met the validity criterion. Reliability was assessed using Cronbach's alpha, which yielded a coefficient of 0.866, exceeding the recommended threshold of 0.60 (Yusup, 2018). Therefore, the instrument was considered reliable.

Data obtained from the critical thinking skills test were analyzed using descriptive statistics, including mean scores, percentages, and performance categories for each critical thinking indicator. Students' critical thinking achievement scores were calculated as percentages using the following formula.

$$\text{Critical Thinking Score: } \frac{\text{Score obtained}}{\text{Maximal score}} \times 100$$

The critical thinking skills scores obtained are then interpreted based on the categories very good, good, enough, not enough, very less based on Table 2.

**Table 2.** Interpretation of Students' Critical Thinking Skills Scores (Arikunto, 2019)

| No. | Score | Category |
|---|---|---|
| 1. | 100 – 81 | Very Good |
| 2. | 80 – 61 | Good |
| 3. | 60 – 41 | Enough |
| 4. | 40 – 21 | Not Enough |
| 5. | < 20 | Very Less |

The student response questionnaire instrument contains 10 questions with answer choices using a Likert scale between one (Strongly Disagree) to 4 (Strongly Agree) with a maximum score of 4 points.

## RESULTS AND DISCUSSION

Developments in the 21st century require people to have skills, one of which is critical thinking skills. Critical thinking skills are needed because they can determine the success of a person's life, both in solving problems and making decisions. Critical thinking skills are also necessary in the teaching and learning process, especially in science learning, to determine its success. Science learning can also be used to improve students' critical thinking skills. This research focuses on determining the level of students' critical thinking skills on ecosystem topic.

Critical thinking skills measured in this study include elementary clarification, essential support, inference, advanced clarification, strategy, and tactics. The questions are 10 multiple choice questions, each adjusted to the selected critical thinking skills indicator. The results obtained from essential thinking skills tests are very diverse. Information regarding students' critical thinking skills, which includes critical thinking skills test results, number of students, score range, average score, percentages, and categories, is presented in Table 3 and Figure 1..

**Table 3.** Categories of Critical Thinking Skills

| Score | Number of Students | Percentage (%) | Category |
|---|---|---|---|
| **100 – 80** | 1 | 1 | Very good |
| **80 – 61** | 15 | 9 | Good |
| **60 – 41** | 59 | 36 | Enough |
| **40 – 20** | 71 | 43 | Not enough |
| **< 20** | 19 | 11 | Very less |

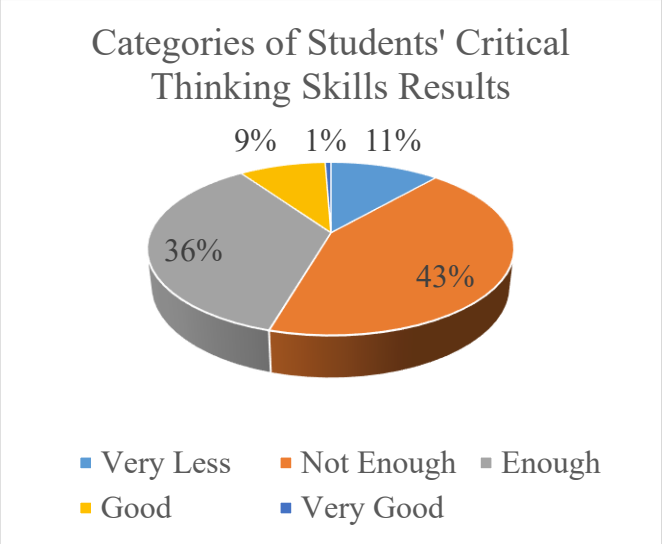



**Figure 1.** Categories of Students' Critical Thinking Skills Test Results

Based on Table 3 and Figure 1, it is known that as many as 1% of students are in the very good category, 9% of students are in the good category, 36% of students are in the poor category, 43% of students are in the poor category, and 11% of students are in the very good category. Not enough. This shows that there are significant differences between each category of students' critical thinking skills. Many students do not yet have critical thinking skills, so special attention and action are needed to improve student's critical thinking skills, especially in the low and very low categories. Research conducted by Amalia et al. (2023) also indicates that most students have not been able to achieve critical thinking skills, which suggests that the achievement level is still low. Research from Ayun et al. (2020) also states that junior high school students' critical thinking skills category is in the low category. Students' low essential thinking skills can be caused by a learning system still dominated by teachers and teachers who are not optimal in honing students' active roles and thinking potential (Ayun et al., 2020). Another factor that causes this is that learning is more oriented toward memorization, so students are weak in conveying their thoughts and are not confident in their abilities (Nuryati et al., 2018).

Students' achievements in critical thinking skills are grouped based on each indicator and are presented in Figure 2.

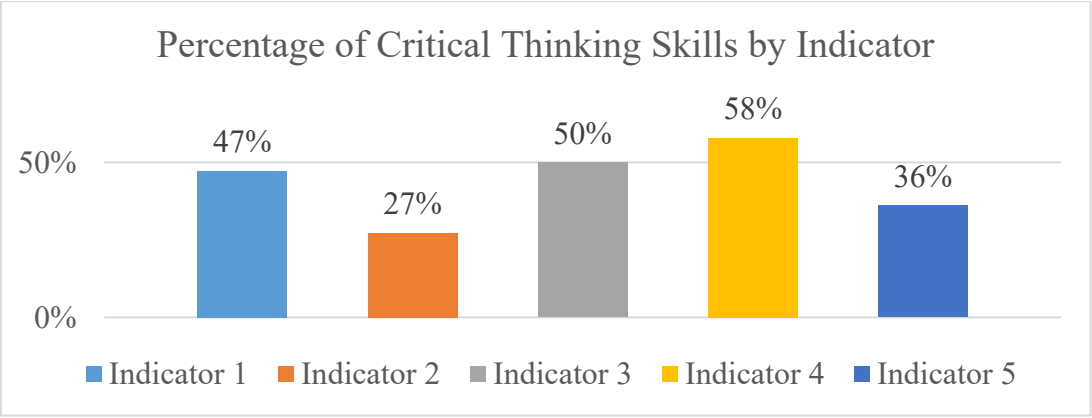



**Figure 2.** Percentage of Critical Thinking Skills Based on Indicators

The data in Figure 2 was obtained by calculating the average percentage of correct answers for each indicator, with each indicator consisting of two questions. Indicator 1 of critical thinking skills is regarding elementary clarification, which obtained a score of 47%, indicator two regarding essential support, obtained the lowest score among the five indicators, namely 27%, indicator three regarding inference obtained a score of 50%, indicator four regarding advance clarification obtained the highest score, namely 58%, and indicator five relating to strategic and tactics obtained a score of 36%. The data shows that of the five indicators, four are in the low category with a range of 26-50%, and one is in the medium category. These results indicate that most students have not been able to achieve critical thinking skills and that their critical thinking skills are still low.

Elementary clarification indicates being able to focus on questions, analyze arguments, and ask and answer questions. Indicator elementary clarification obtained a score of 47% in the sufficient category. Based on the percentage score, it can be said that students are quite good at using various information that can help in solving problems so that students can create the best alternative that can be used as a solution in terms of getting used to carrying out the process of re-checking the answers they give to minimize there is an error.

Basic support is an indicator in considering whether a source can be trusted or not to observe and consider observation reports. The basic support indicator received 27% in the poor category. Lack of basic support skills can be caused by students not analyzing these sources correctly.

Inference is an indicator for concluding, in this case, deducing and considering the results of deductions, inducing and evaluating the results of induction, and making and determining the results of considerations. The inference indicator obtained a score of 50% in the sufficient category. This shows that students have made inductions based on the reading provided and have been able to relate it to ecological and biodiversity material.

Advance clarification is an indicator in defining terms and considering a definition. The advance clarification indicator received a score of 58 % in the sufficient category. Based on the scores obtained, the average student could analyze terms by linking them to the reading provided. Increasing advanced clarification, indicators can be done by training students in scientific literacy, which can be provided during learning so that students are more communicative when defining existing terms. This can be done with active debate strategies to train students' critical thinking skills.

Strategy and tactics are indicators of solving a problem, as given in the reading. The strategy and tactics indicator scored 36% in the poor category. Based on the scores obtained, students can still not solve problems or provide solutions when faced with a problem. This indicator is significant for students, especially when facing everyday issues, so it needs improvement. Critical thinking skills on strategic and tactical indicators can be improved through group presentation methods to solve problems. Teachers can also give each group different issues so that students can exchange ideas and share solutions with fellow students.

Students' low critical thinking skills can be caused by students not being used to solving HOTS questions when learning in class. Apart from that, learning is carried out using conventional methods so that students feel more comfortable with the teacher's explanation without wanting to discover more in-depth (Romadona & Adila, 2020). These findings indicate the need for more effective learning strategies and media that support effectiveness in the

learning process, which can help in understanding concepts more deeply and create more curiosity in students (Farwati et al., 2021).

**Table 3.** Results of Student Response Questionnaire Regarding Website Use and Learning Process

| Question | Answer Percentage | | | |
|---|---|---|---|---|
| | SD | D | A | SA |
| Has the teacher taught the lesson using the website? | 3% | 21% | 48% | 28% |
| Using the website makes it easier for me to access learning materials | 4% | 7% | 47% | 42% |
| Websites help me understand the material better than printed books | 7% | 23% | 40% | 30% |
| The website provides more learning materials update (latest) | 4% | 10% | 42% | 44% |
| Websites provide access to various learning resources that are not available in the classroom | 7% | 14% | 40% | 39% |
| I am more motivated to learn if I use websites as a learning resource | 7% | 19% | 45% | 29% |
| Learning using websites allows me to learn anytime and anywhere | 3% | 8% | 43% | 46% |
| Interactive features on the website (such as quiz forms, assignments, etc.) are easy to operate | 2% | 13% | 50% | 35% |
| I feel that learning through this website is more effective than traditional learning methods | 7% | 23% | 41% | 29% |

Note: SD is Strongly Disagree, D is disagree, A is agree, SA, is strongly agree.

The data in Table 3 comes from a questionnaire distributed regarding the use of websites in learning to find out the response to the website. The results of student responses based on questions in the questionnaire show that students gave positive responses for each item of the answer statement provided by the participants; on average, they got the highest percentage of answers to agree (A) and strongly agree (SA). The questions given point to the advantages of using websites during learning.

The results of the questionnaire answered that using websites in learning, especially science learning, makes it easier for students to understand the material compared to using media other than websites. Also, 46% of students agreed, and 29% strongly agreed they were more motivated to learn using the website. Using sites can also improve critical thinking skills because online learning is more interactive and practical than traditional learning. Research conducted by Setianingsih et al. (2024) shows that website-based learning media supports improving critical thinking skills because it contains examples of problems and steps to solve them. Some games and exercises can train students' critical thinking skills. Learning using websites allows students to solve problems given by the teacher well (Kususmaningtyas, 2022).

## CONCLUSION

This study analyzed junior high school students' critical thinking skills in the context of the ecosystem topic at SMP YPM 4 Bohar Taman. The results revealed varying levels of performance across five critical thinking indicators: elementary clarification (47%), basic support (27%), inference (50%), advanced clarification (58%), and strategies and tactics (36%). These findings indicated that students' critical thinking skills were generally low, consistent with previous studies examining critical thinking skills across various science topics. The results highlighted the need to implement instructional strategies to enhance students' critical

thinking skills. One potential approach is to integrate problem-based learning with website-based learning media to create more engaging learning experiences, facilitate students' understanding of ecosystem concepts, and support the development of critical thinking skills.

Further research is recommended to investigate the long-term effectiveness of integrating problem-based learning with website-based learning media in enhancing students' critical thinking skills, improving their retention of ecosystem concepts, and strengthening their ability to apply scientific knowledge to real-world environmental problems. Longitudinal or experimental studies could provide further empirical evidence regarding the sustainability of these improvements and the effectiveness of the proposed instructional approach.

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